

daughter-granules are separated by the growth itself and by accident, and the division is determined by the dilaceration of the threads. The young granules increase in size, and acquire their normal figure. After the division, there may be found upon the granules a few protoplasmatic hyalin cilia, divided in groups. These cilia are the remainder of the divisional threads. All these cilia spring from points where dark spots are seen upon the surface of the living granules. The compressed granules of Hartwegia, of Fern-Prothallia, of Vallisneria, and Elodea offer most favourable opportunities for ascertaining the manner of division. This singular process is repeated again and again, so that the older granules are compressed, and a filament is formed, which elongates more and more rapidly as the granules increase in number. Sometimes the filament may be ramified. This continued multiplication by division has its limits; the protoplasmatic bearer (the matter of the granule, which carries the colouring substance) changes its appearance, and contains starch-granules, which soon become numerous. The whole process cannot, of course, be seen in the same granule, but in some, dividing granules may be observed in one stage, and in others in another. In such a manner (though the process is not so clear) divides the endochrome of the Bacillariaceæ, as I have studied it, in *Himantidium pectinale*. That is the manner of division certainly most common. The second mode of multiplication by division is more simple. The granules are divided by a constriction, and separate into single granules; the daughter-granules become detached after they have reached their full form and size. No cilia or threads, only a small number two to three (not six to eight) are formed by the division in the isthmus between the half-granules. This division is a reduced form of the former, that is, the direct division without cilia; the former is the indirect division with cilia. The direct division I have studied in all higher and lower green plants in all seasons of the year. The second form, the direct division, is seen especially in the cells of *Vaucheria* and *Chara*. These changes in the division of chlorophyll-granules of which we speak, can only be observed with a considerable magnifying power (2000-3000 lin. mag.), that is the cause why Mikosch agrees with the other authors mentioned in disclaiming the notion of threads of the true mode of division. I ascertained these changes in March of the year 1880, and described them in a short notice in the *Magyar Növénytaní Lapok* (Hungarian Journal of Botany, edited by Prof. Dr. Kanitz Kolosvár (vol. iv. pp. 32-43).

II. Prof. Pringsheim,¹ after ascertaining the occurrence of hypochlorin in all higher chlorophyllous plants, and in many green algae, speaks in his paper, with reference to the Bacillariaceæ, "Sie fehlt (the hypochlorin) dagegen bei den nicht chlorophyll grünen Gewächsen; also bei den Phycocromaceen, Diatomeen, Phaesporen. . . . Wenigstens konnte ich sie bisher in den genannten Pflanzengruppen noch nicht sicher nachweisen und nur Spuren derselben ist es mir geglückt, in manchen Entwicklungstadien einiger *Diatomeen* aufzufinden." I have, with the use of diluted muriatic acid, proved the occurrence of hypochlorin in all the Bacillariaceæ and Cyanophyceæ (Phycocromaceæ) investigated. The experiment succeeded best with *Calothrix scopulorum*. The hypochlorin was seen in all these plants in the typical form of brown scales or brown drops.

SCHAARSCHMIDT GYULA

Botanical Institute of the Royal Hungarian University,
Kolosvár (Hungary), August 3

Mimicry in the "Plume Moths"

I HAVE not seen in any entomological work an attempt to explain the well-known peculiar character of the wings of the "Plume Moths" (*Pterophori*). They depart so thoroughly from the rest of the Lepidoptera in having the wings cleft into so-called feathery "plumes" (although retaining the microscopic scales characteristic of their order), that we may be certain so marked a type must have been evolved along definite lines and for specific reasons. One species (*Agdistes Bennetii*) may be regarded as the first stage in the differentiation of these insects; and from this species we have successive modifications in the number of "plumes" up to *Alucita polydactyla*, where the ordinary wings are split up into no fewer than twenty-four.

I have long thought this wing-peculiarity is due to *mimicry*, the objects mimicked being the down or *pappi* of thistles and other composite plants. The commonest of the "Plume

Moths," perhaps, is the "Large White Plume" (*Pterophorus pentadactylus*), and all entomologists are acquainted with its peculiar *drifting* mode of flight, exactly resembling that in which a thistle plume is blown by the wind. The other day I followed what I took to be a drifting thistle-plume, for the sake of seeing what species it belonged to, and found it to be a specimen of this species of moth, so remarkably similar do the two objects appear when in motion. If the intention of the "plume-moths" is to mimic the *pappi* of winged-seeds, we can understand why these insects do not fold the wings to the body when at rest, but seem to display them to the utmost instead.

The fact that (according to Stainton), out of about twenty species of *Pterophori*, the larvæ of which have their food plant given, no fewer than ten feed on composite plants, or plants bearing plumed seeds, indicate that the resemblance of the winged insects to pappi must also be protective to females when depositing their eggs on plants which produce down, as well as when they are flying. It would be interesting to compare the different kinds of thistle and other down with the appearance of the various species of "plume-moths" which thus appear to mimic them.

J. E. TAYLOR

Ipswich Museum, September 5

NOTE ON SOROCHÉ (MOUNTAIN SICKNESS) IN THE ANDES

THE effects of diminished atmospheric pressure on the human economy seem to vary so much with different individuals that a few facts of personal experience may be of some interest to those who have attended to the subject. During a somewhat prolonged acquaintance with mountain travelling, I had never felt any of the symptoms described as characteristic of mountain sickness. The only effect of rarified air that I had been able to verify was that an equal amount of mechanical effort produced at a great height necessitates a greater effort, so that climbing or other muscular effort causes, *ceteris paribus*, more sense of fatigue. Being in Peru in the month of April last, I was about to avail myself, with a friend, of the opportunity afforded by the reopening for traffic of the Oroya railway, and to spend a few days at Chicla, the present terminus of that remarkable work. The height of Chicla above the sea is 12,200 feet, and we were assured by several residents in Lima that we should infallibly suffer from the *soroche*, the local name for mountain sickness in Spanish America. Not having ever experienced the slightest inconvenience at heights considerably exceeding that limit in the Alps, I treated these warnings with some derision, and in truth they had passed from my mind on the evening when I arrived at Chicla. I may say at once that neither there nor anywhere else have I experienced any of the symptoms of mountain sickness by day, or while up and moving about after dark. On the evening of our arrival, after a frugal supper we retired to bed about eleven o'clock. Soon after falling asleep, I awoke with a severe headache, which continued throughout the night, allowing only a few short and broken snatches of sleep, but which passed away soon after I rose somewhat before sunrise. On comparing notes with my friend, I found that he also had suffered from headache during the night; but as he is somewhat subject to that affection, he had not attributed it to any special cause, whereas with me it is most unusual.

The following day was spent in botanising on the steep slopes upon either side of the valley at Chicla, and as I was quite free from any inconvenient sensation, I attributed the headache of the previous night to some accidental cause rather than to diminished pressure. On the second night, going to bed about the same hour, I again awoke with a headache more severe than that of the previous night, and was altogether unable to sleep for the rest of that night. Some two or three hours after midnight I was suddenly seized with retching of the stomach, but, perhaps because my light dinner was fully digested, no further effect followed.

We had arranged for the succeeding day to ride to the

¹ Ueber Lichtwirkung und chlorophyllfunction in der Pflanze Jahrb. f. wiss. Bot. xii., 1881. Heft iii. p. 296.

summit of the pass where a tunnel for the railway was nearly completed before the troubled state of the country put a stop to the work. Owing to delays, usual in that part of the world, we were unable to start until ten o'clock. Partly on that account, and partly because snow had fallen during the night towards the summit of the pass, we resolved to halt at a point about 14,300 feet above the sea, and devote a couple of hours to the very interesting vegetation of that region. Although the path was not steep in that part, my horse, a spirited animal, already showed symptoms of distress, panting for breath and pausing at every few yards; but neither I nor my companion felt the slightest inconvenience during the day. On my return I fully expected some renewal of the symptoms of the preceding night, but to my surprise I slept perfectly on that as well as the succeeding night, as did also my companion. It seemed as if the ascent to a higher level and the return to Chicla had the effect of acclimatising us.

I should mention that on the first two nights we both noticed one further symptom of derangement of the functions in the extreme turbidity of the secretion from the kidneys, but this as well as the others disappeared on the third night. I failed to detect any disturbance of the respiration or the circulation, although my attention was specially directed to these which are the ordinary, but not invariable, symptoms of mountain sickness.

J. BALL

DREDGING IN THE NORWEGIAN FJORDS

BEFORE leaving this enchanting spot (Lervik on the island of Stordoe near Bergen) where, in company with Mr. A. G. Bourne, I have spent the month of August, I send a few hurried lines to give an outline of the results which a month's dredging and microscopising have yielded. Lervik was introduced to me by the Rev. Alfred Norman, who two years since found here, at a depth of 100 fathoms in the Hardanger Fjord (about five miles from Lervik haven), that very remarkable Polyzoan mollusc, *Rhabdopleura*. Mr. Norman originally discovered this organism off the Shetlands, and it has since been described from specimens observed in the Lofoten Islands by Prof. G. O. Sars, who was able to give a more complete account of it than had been possible for Prof. Allman, who described and named Mr. Norman's Shetland specimens preserved in alcohol.

During ten days of my stay here I have had the great advantage of the company of Mr. Norman, whose knowledge of dredging operations and of the northern marine fauna is unrivalled. My object has been to make a further study of *Rhabdopleura* upon fresh and living examples, and in this I have been successful. At first we found *Rhabdopleura* only at great depths attached to recently dead pieces of the beautiful coral, *Lophohelia prolifera*. But subsequently we have been able to dredge it and bring it in for study within an hour, having discovered it in water of only 25 fathoms depth at the mouth of the harbour where it occurs in the form of creeping colonies upon *Ascidia mentula*, and on dead shells. A body-cavity, tentacular skeleton, male reproductive organs, and various facts as to the mode of growth, gemination, and development of the polypides, are the new features which these specimens have so far brought to light, whilst they have also served to confirm in many important respects the description given by G. O. Sars.

Our next most important "find" has been a very interesting green-coloured Gephyrean, in all probability identical with the *Hamingia arctica* of Koren and Danielson, known hitherto only by one spirit-specimen, described last year by the Norwegian zoologists, and by a second dredged here two years since by Mr. Norman, but as yet unnoticed. The published specimen appears to

have lost its frontal process or appendage, which was perfect in the one dredged by us. The aspect of the complete worm is precisely that of a green *Thalassema*, from which, however, it differs most importantly in the absence of genital setæ, and in the structure of the cloacal nephridia, as also in the number and structure of the oviducts. *Hamingia* is also remarkable, as is *Thalassema neptuni* (which I obtained last year in quantity on the south coast of Devon) for having in its perivisceral fluid a large number of corpuscles deeply impregnated with Hæmoglobin, which give to the fluid a blood-red colour.

The special feature of the sea-bottom at depths of 100 fathoms and upwards, in these Norwegian Fjords, is the abundance of corals and Alcyonians. Nothing can exceed the delicate beauty of the white branches of *Lophohelia prolifera*, with which our "tangles" are always filled. *Amphihelia ramea* is nearly as frequent. *Allopora Norvegica*, a fine example of the Stylasteridæ made famous by Prof. Moseley, is also very abundant. But the most splendid of these coral forms is the *Paragorgia arborea*, of which we have taken a stem as thick as a man's arm, its branches spreading over three feet, and all (when living) of a perfectly uniform rose colour, as though modelled in wax of that tint. Allied forms—*Paramuricia placemus* and *Primnoa lepadifera*—are not uncommon, the latter affecting a bright salmon colour. The soft parts of nearly all these forms have yet to be studied in detail, and the preservation of samples in the approved reagents has been our special care.

Antedon Sarsii, *Rhizocrinus lofotensis*, *Neomenia carinata*, and *Chaetoderma nitidulum* are amongst the scarce animals of exceptional interest which we have had the good fortune to dredge. On the other hand, *Terebratulina caput-serpentis* and *Waldheimia cranium* are very abundant in only thirty fathoms, and Mr. Bourne has commenced an investigation of their structure which has been hitherto neglected, probably on account of the marvellous completeness of the account given by Hancock of *Waldheimia Australis*, based though it was on the study of spirit-specimens. A first result is that *Terebratulina* is not monœcious, but males and females are distinct.

Amongst animals of common occurrence or of less interest from an anatomical point of view, we have taken the following, identified by Mr. Norman, who has himself a much longer list from this and other parts of the Norwegian coast. Of Echinoderms, *Psolus squamatus*, *Oligotrochus vitreus*, *Holothuria elegans*, *H. intestinalis*, *Echinocucumis typica*, *Echinus sphaera*, *E. Flemingii*, *Spatangus purpureus*, *Echinocyamus pusillus*, *Echinocardium ovatum*, *Goniaster Phrygiæ*, *Porania pulvillus*, *Astrogonium granulare*, *Archaster Parelli*, *Luidia Sarsii*, *Solaster furcifer*, *Stychaster roseus*, *Cribella oculata*, *Asterias rubens*, *A. glacialis*, *Ophiopholis aculeata*, *Ophiocoma nigra*, *Ophioglypha lacertosa*, *O. albida*, *Ophiocolex purpurea*. Cf larger Crustaceans, *Hyas coarctatus*, *Galathea tridentata*, *Munida Banfica*, *Hippolytus securifrons*, *Pandalus annulicornis*, *Pasaphæa Savignii*. Of Sponges there are a very large number which have never yet been examined; amongst those recognised were *Thenia Wyville-Thomsonii*, *Geodia norvegica*, *Thecaphora* (a "Porcupine" form), *Quassilina brevis*, *Asbestophuma* (a new genus of Norman), and other common forms. The Rhizopods include some very extraordinary and large forms, abundant *Haliphysema*, *Astrorhiza limicola*, many arenaceous species, and a black sausage-like organism attaining a length of one-third of an inch, the skin of the sausage, membranous with an emarginate aperture at one pole—the contents hyaline protoplasm with an immense number of large dark green granular corpuscles embedded in it. Of the Nemertines and Chaetopods, I will not venture to speak without library, and the list of mollusca would fill a whole column of NATURE. One word I would say in conclusion, namely, that were a real zoological station, similar to that of